Seasonic Focus Plus Platinum 650W

Serial Number R1707AA170400337

Lab ID 241

Certification ID 25241

Test Result Report ID:

Certificate Issue Date: Nov 12, 2018

Scheme: ETA-EMI PSU

115V 230V

Scheme: LAMBDA PSU

115V 230V

Aristeidis Bitziopoulos, Certification Body General Manager

General Information

Test Equipment

Electronic Loads	Chroma 63601-5 x2 Chroma 63600-2 Chroma 63640-80-80 x10 Chroma 63610-80-20
AC Sources	Chroma 6530, APM SP300VAC4000W-P, GW Instek ASR-3500
Power Analyzers	Rohde & Schwarz HMC8015 & NPA701
Oscilloscopes	Picoscope 4444, Siglent SDS2104X PLUS
Sound Analyzer	Bruel & Kjaer 2270 G4
Microphone	Bruel & Kjaer Type 4955-A
Temperature Logger	Picoscope TC-08
Tachometer	UNI-T UT372
Multimeters	Keysight 34465A
EMI Analyzer	TekBox TBMR-110M-EU
Isolation Transformer	4kVA
UPS	FSP Champ Tower 3kVA, CyberPower OLS3000E 3kVA
Testing Methodology	Cybenetics PSU Test Protocol

DUT Information(Non-accredited measurements)

Product Identification Details	
Brand	Seasonic
Model	Focus Plus Platinum 650W
OEM/ODM	Seasonic
Serial Number	R1707AA170400337
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	9-4.5
Rated Frequency (Hz)	50-60

Rated Power (W)	650
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	120mm Fluid Dynamic Bearing Fan (HA1225M12F-Z)
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	241
Date of receipt	Nov 1, 2018
Testing Date	Nov 9, 2018
Report Issued Date	Nov 12, 2018
DUT Notes	Retested on 04/10/2018
Engineer Name	-
Authorized By the Laboratory Technical Manager	Aristeidis Bitziopoulos
Signature	

Cables and Connectors(Non-accredited measurements)

Modular Cables				
Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (600mm)	1	1	18-22AWG	Yes
4+4 pin EPS12V (650mm)	1	1	18AWG	Yes
6+2 pin PCIe (680mm+80mm)	2	4	18AWG	Yes
SATA (450mm+110mm+110mm+110mm)	2	8	18AWG	No
4 pin Molex (450mm+120mm+120mm)	1	3	18AWG	No
FDD Adapter (+105mm)	1	1	22AWG	No
AC Power Cord (1370mm) - C13 coupler	1	1	18AWG	No

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	54	3	0.3
	Watts	100		648	15	3.6
Total Max. Power (W)		650				

Parts Description

General Data	
Manufacturer (OEM)	Seasonic
Platform Model	PX
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV , 1x CM02X
Inrush Protection	NTC Thermistor & Diode
Bridge Rectifier(s)	2x GBU1506 (600V, 15A @ 100°C)
APFC MOSFETS	2x Infineon IPP50R199CP (550V, 15A @ 100°C, 0.199Ohm)
APFC Boost Diode	1x STMicroelectronics STTH8S06D (600V, 8A @ 125°C)
Hold-up Cap(s)	1x Nippon Chemi-Con (400V, 450uF, 2000h @ 105°C, CE)
Main Switchers	4x Infineon IPP50R250CP (550V, 9A @ 100°C, 0.25Ohm)
APFC Controller	Champion CM6500UNX
Resonant Controller	Champion CM6901T6X
Topology	Primary side: Full-Bridge & LLC Resonant Controller Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	4x Nexperia PSMN2R6-40YS (40V, 100A @ 100°C, 3.7mOhm @ 100°C)
5V & 3.3V	DC-DC Converters: 6x Infineon BSC0906NS (30V, 40A @ 100°C, 4.5mOhm) PWM Controller: APW7159
Filtering Capacitors	Electrolytics: Chemi-Con (1-5,000 @ 105°C, KZE), Chemi-Con (4-10,000 @ 105°C, KY), W Polymers: Chemi-Con
Supervisor IC	Weltrend WT7527V (OVP, UVP, OCP, SCP, PG)
Fan Model	Hong Hua HA1225M12F-Z (120mm, 12V, 0.45A, 2050 RPM, Fluid Dynamic Bearing)
5VSB Circuit	

Standby PWM Controller	Excelliance EM8569C
Rectifier	P10V45SP SBR (45V, 10A @ 50% Duty Cycle)

Test Results

Temperature & Compliance Info

Temperature Range (°C /°F)	28-32 / 82.4-89.6
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓

Performance Summary

115V

Accredited	
Average Efficiency (>1450 load combinations)	90.168%
Average Noise Output (>1450 Load Combinations)	25.35dBA
Average PF (>1450 Load Combinations)	0.986
Efficiency With 10W (≤500W) or 2% (>500W) Load	-
Standby Power Consumption	0.0490W
Non-Accredited	
12V Ripple (Full Load)	24.51mV
5V Ripple (Full Load)	11.00mV
3.3V Ripple (Full Load)	9.38mV
5VSB Ripple (Full Load)	8.06mV
12V Load Regulation	0.09%
5V Load Regulation	0.14%
3.3V Load Regulation	0.27%
5VSB Load Regulation	2.37%
Inrush Current	37.927A

230V		
Accredited		
Average Efficiency (>1450 load combinations)	91.989%	
Average Noise Output (>1450 Load Combinations)	24.09dBA	
Average PF (>1450 Load Combinations)	0.953	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.0766W	
Non-Accredited		
12V Ripple (Full Load)	25.13mV	
5V Ripple (Full Load)	11.46mV	
3.3V Ripple (Full Load)	9.75mV	
5VSB Ripple (Full Load)	6.02mV	
12V Load Regulation	0.02%	
5V Load Regulation	0.14%	
3.3V Load Regulation	0.27%	
5VSB Load Regulation	2.29%	
Inrush Current	62.944A	
Hold-Up Time & PWR_OK Signal	22.00ms	
AC Loss to PWR_OK Hold Up Time	17.40ms	
PWR_OK Inactive to DC Loss Delay	4.60ms	
OPP (0.00°C / 0.00°C)	-	-

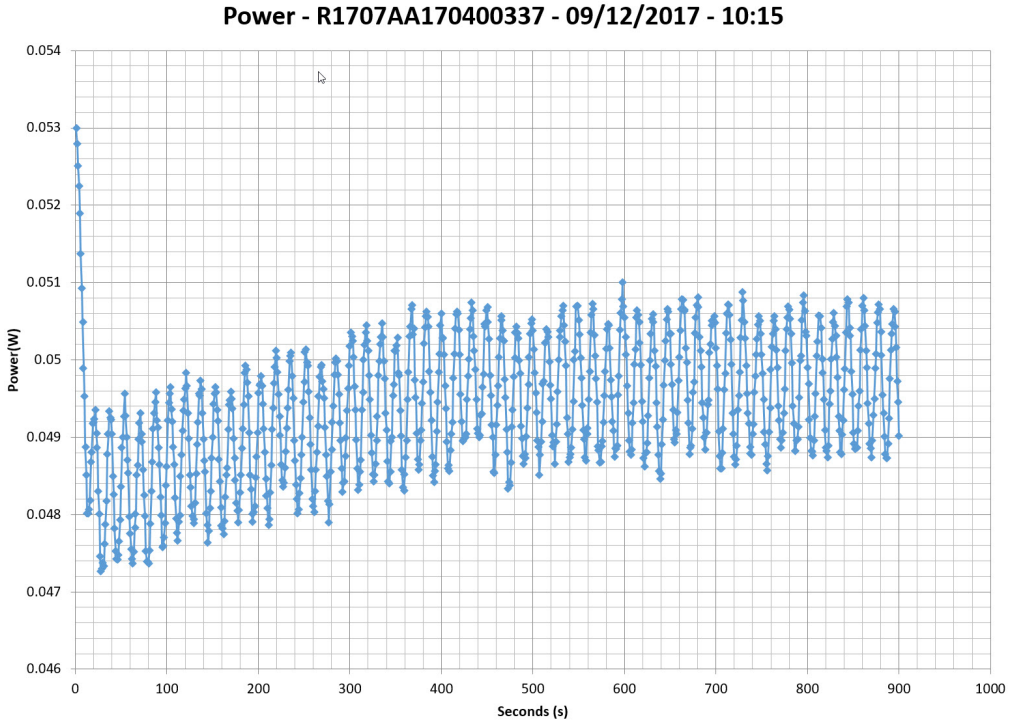
Hold-Up Time & PWR_OK Signal

Hold-Up Time (ms)	22
AC Loss to PWR_OK Hold Up Time (ms)	17.4
PWR_OK Inactive to DC Loss Delay (ms)	4.6

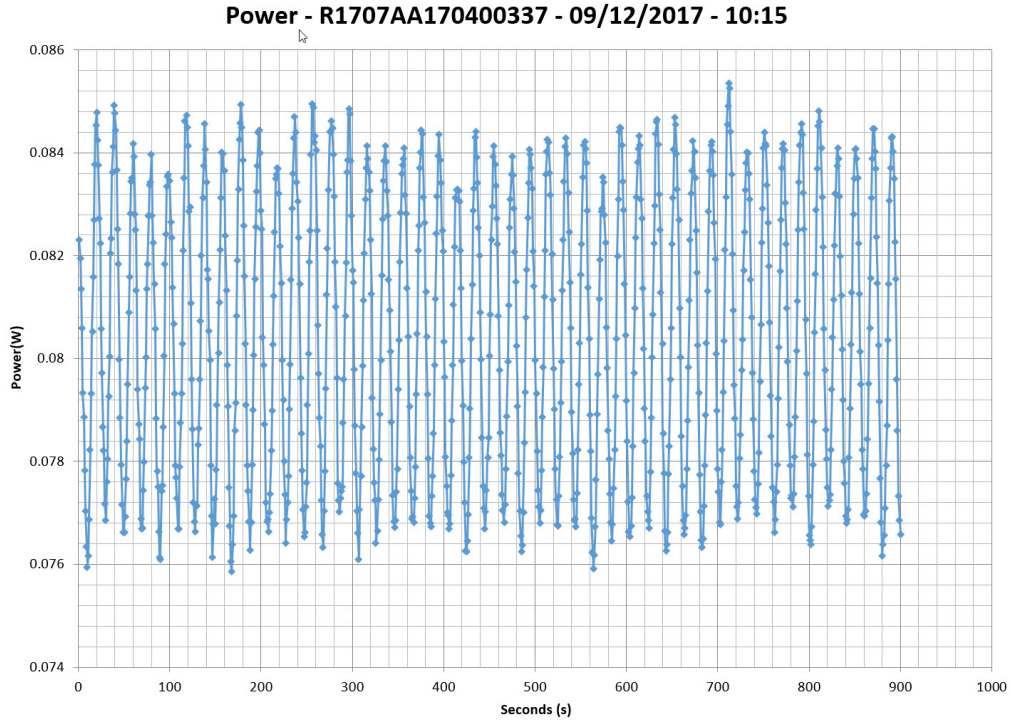
Vampire Power

Graphs

115V

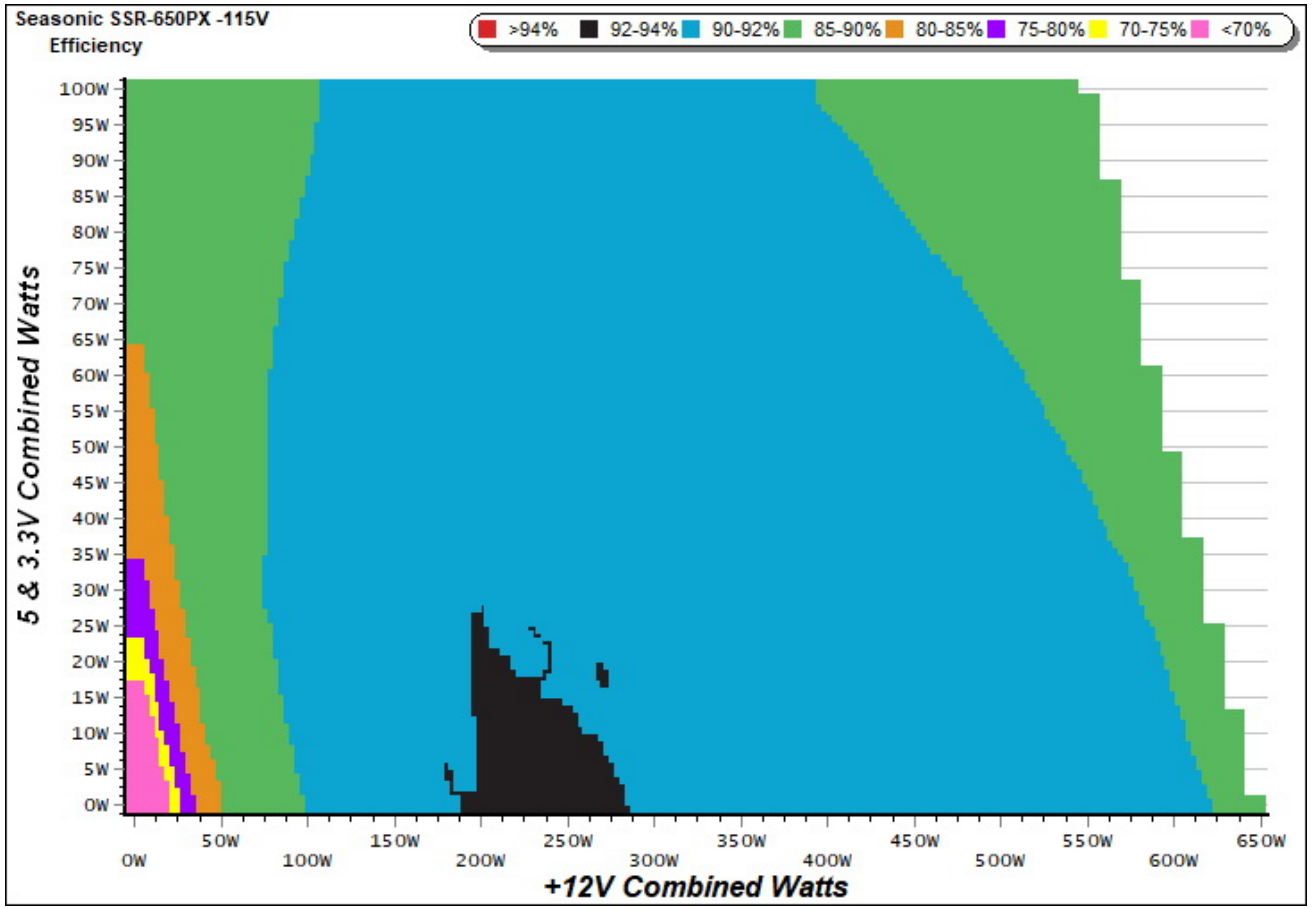


230V



Efficiency Graph

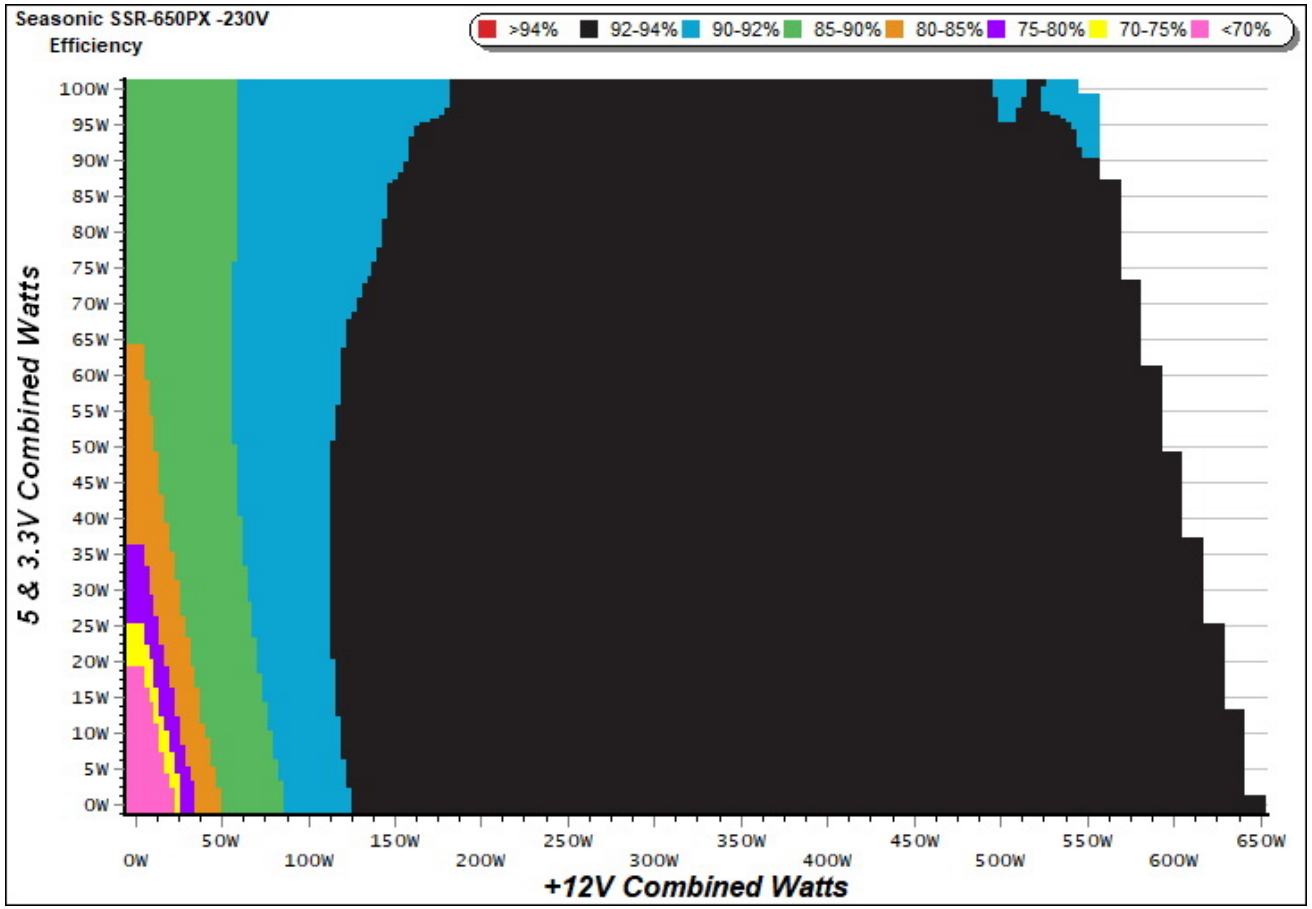
115V



INFO

This graph depicts the PSU`s efficiency throughout its entire operational range. For the generation of the efficiency and noise graphs we set our loaders to auto mode through our custom-made software before trying thousands of possible load combinations.

230V

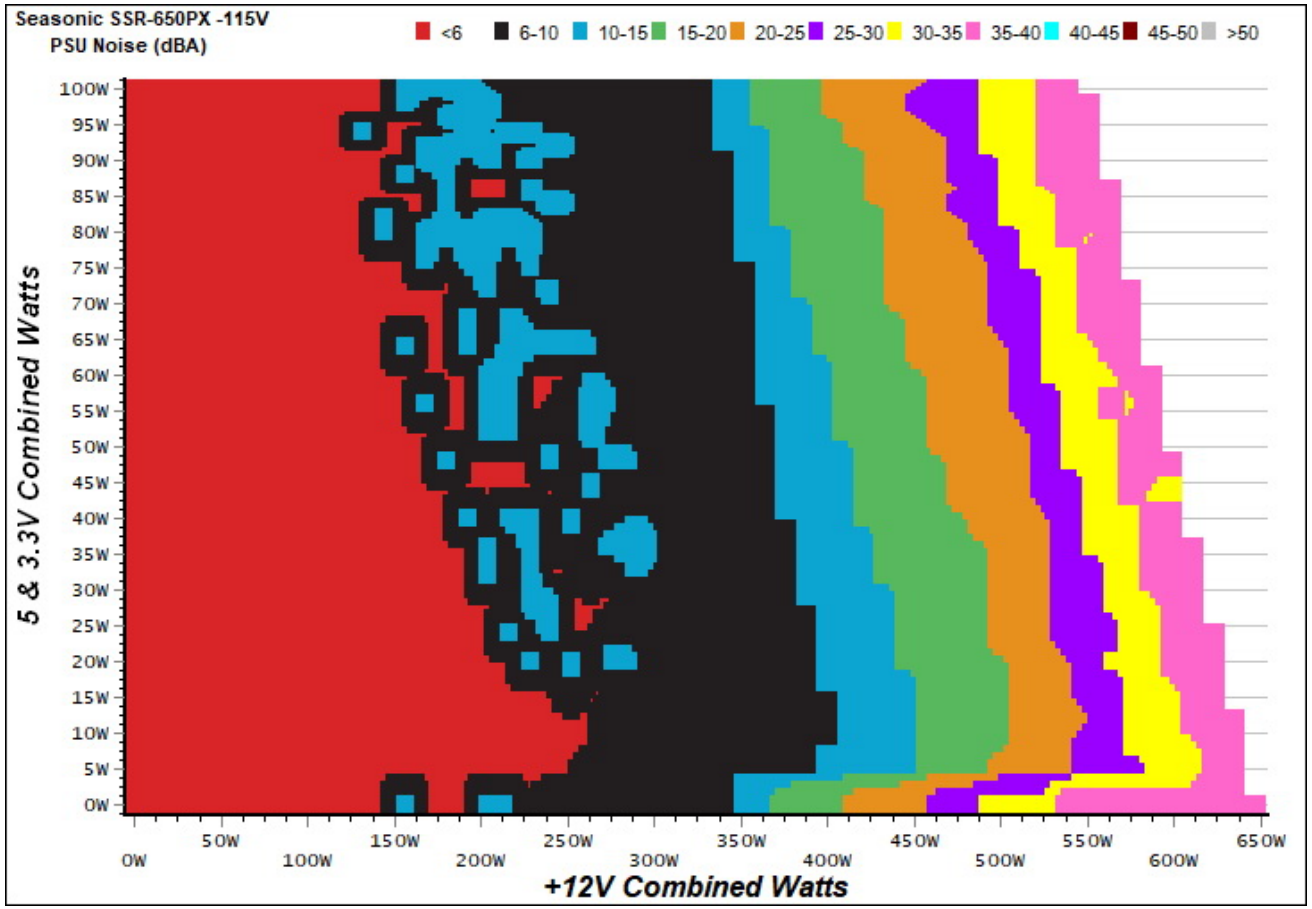


INFO

This graph depicts the PSU`s efficiency throughout its entire operational range. For the generation of the efficiency and noise graphs we set our loaders to auto mode through our custom-made software before trying thousands of possible load combinations.

Noise Graph

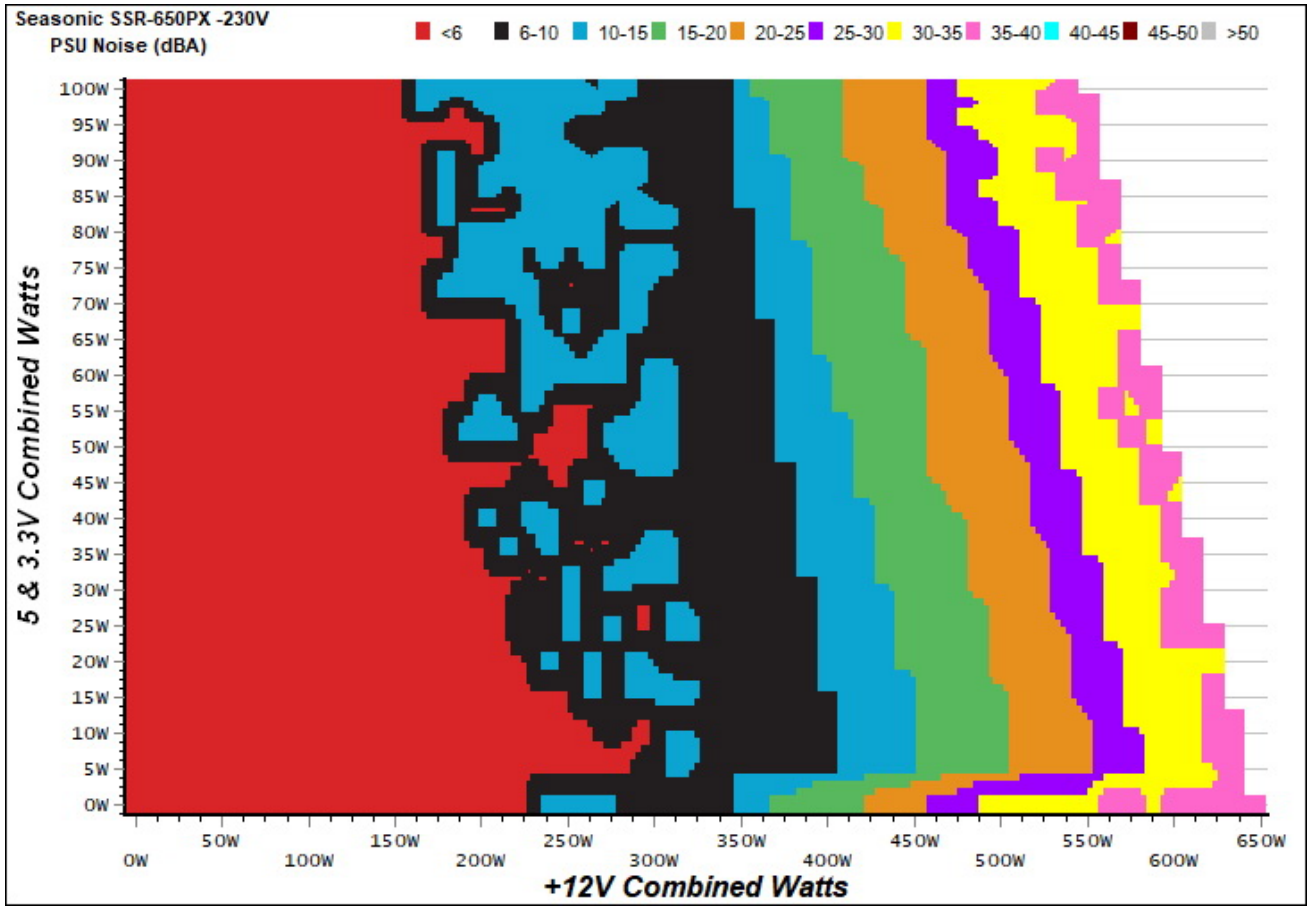
115V



INFO

The PSU`s noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails.

230V

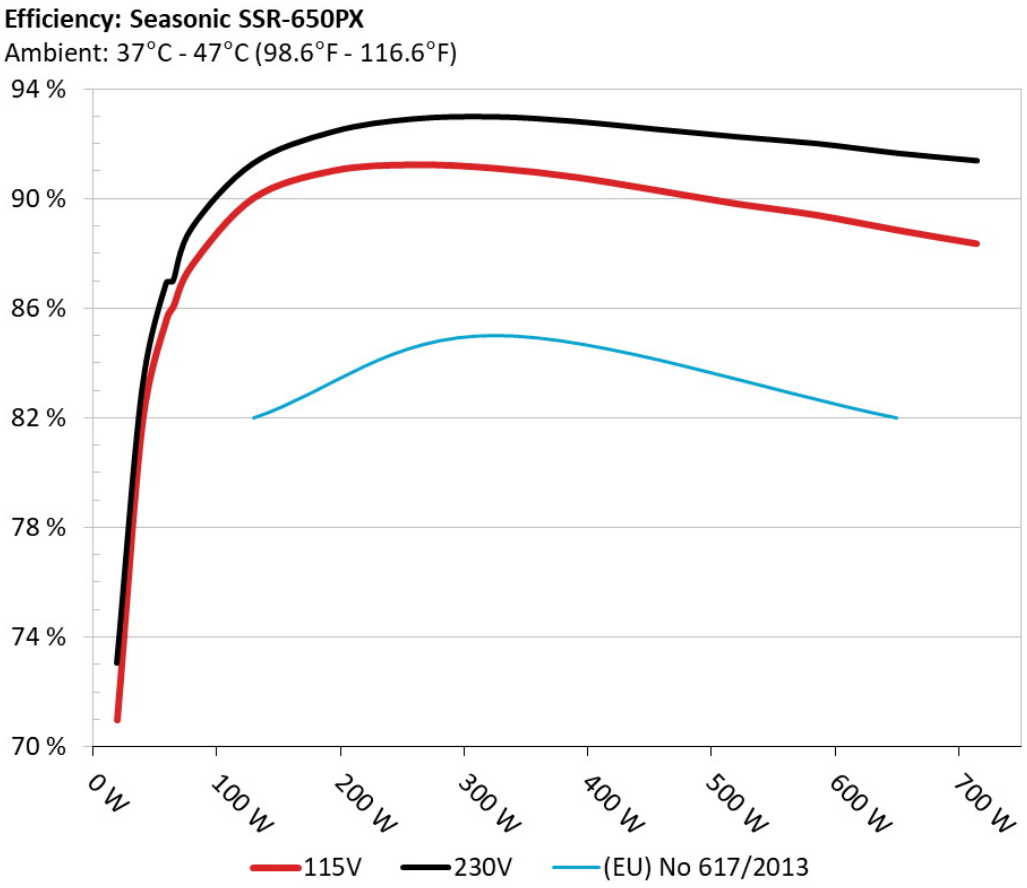


INFO

The PSU`s noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails.

Indicative Performance

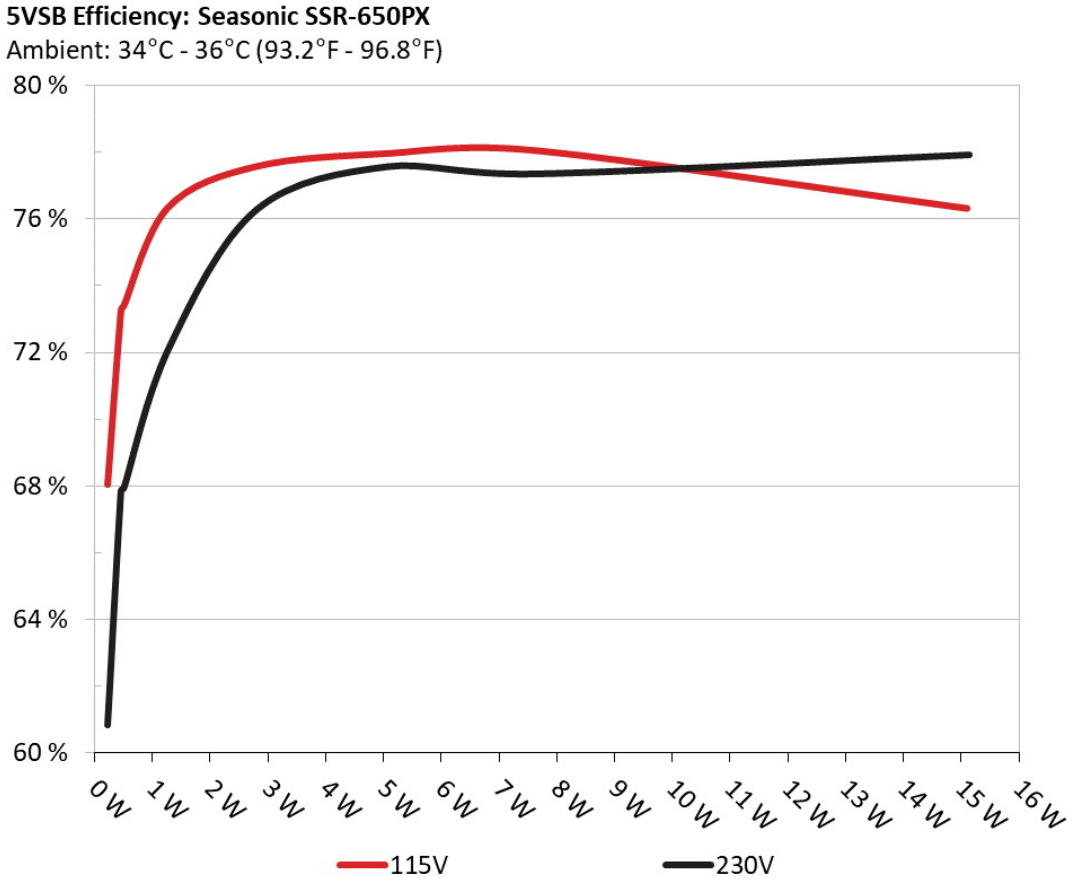
Efficiency under high ambient temperature



INFO

The PSU`s efficiency under high ambient temperatures with 115V and 230V input. For this graph the results of the 10-110% load regulation table are used.

5VSB Efficiency



INFO

This graph depicts the efficiency levels of the 5VSB rail with 115V and 230V input.

5VSB Efficiency (ERP LOT 3/6 & CEC)

115V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.230	68.047%	0.029
	5.112V	0.338		115.27V
2	0.090A	0.460	73.248%	0.054
	5.111V	0.628		115.27V
3	0.550A	2.805	77.593%	0.251
	5.100V	3.615		115.26V
4	1.000A	5.090	77.984%	0.350
	5.091V	6.527		115.26V
5	1.500A	7.619	78.072%	0.408
	5.080V	9.759		115.26V
6	3.000A	15.106	76.335%	0.479
	5.036V	19.789		115.25V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.230	60.847%	0.012
	5.112V	0.378		230.83V
2	0.090A	0.460	67.847%	0.021
	5.111V	0.678		230.82V
3	0.550A	2.805	76.285%	0.106
	5.100V	3.677		230.82V
4	1.000A	5.090	77.580%	0.175
	5.090V	6.561		230.81V
5	1.500A	7.619	77.358%	0.236
	5.079V	9.849		230.82V
6	3.000A	15.135	77.931%	0.338
	5.045V	19.421		230.82V

Supplementary Tests (For Reference)

Typical Load Tests

115V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	3.557A	1.984A	1.989A	0.984A	64.736	86.050%	0	<6.0	45.47°C	0.958
	12.134V	5.029V	3.316V	5.084V	75.231				38.02°C	115.29V
2	8.107A	2.983A	2.985A	1.183A	129.267	89.991%	0	<6.0	46.33°C	0.979
	12.134V	5.028V	3.315V	5.074V	143.644				38.38°C	115.20V
3	13.051A	3.481A	3.470A	1.382A	194.391	90.999%	0	<6.0	47.30°C	0.987
	12.136V	5.028V	3.315V	5.064V	213.620				38.77°C	115.11V
4	17.994A	3.976A	3.983A	1.583A	259.599	91.212%	485	9.3	39.00°C	0.989
	12.138V	5.027V	3.314V	5.054V	284.610				49.36°C	115.12V
5	22.606A	4.974A	4.982A	1.785A	324.927	91.087%	445	9.6	39.68°C	0.990
	12.139V	5.027V	3.313V	5.044V	356.722				51.37°C	115.02V
6	27.154A	5.970A	5.977A	1.987A	389.451	90.764%	795	18.9	40.03°C	0.991
	12.140V	5.026V	3.312V	5.033V	429.079				51.88°C	114.92V
7	31.770A	6.962A	6.978A	2.191A	454.772	90.291%	1155	28.7	41.34°C	0.991
	12.140V	5.025V	3.310V	5.022V	503.673				53.59°C	114.94V
8	36.388A	7.964A	7.979A	2.395A	520.095	89.795%	1670	37.2	42.84°C	0.991
	12.138V	5.024V	3.309V	5.012V	579.203				55.57°C	114.84V
9	41.400A	8.463A	8.464A	2.398A	585.024	89.380%	2005	41.1	43.86°C	0.991
	12.138V	5.023V	3.308V	5.005V	654.535				56.75°C	114.74V
10	46.149A	8.962A	8.980A	3.009A	649.864	88.838%	2025	41.2	45.29°C	0.992
	12.138V	5.022V	3.307V	4.986V	731.517				58.65°C	114.63V
11	51.480A	8.963A	8.982A	3.013A	714.688	88.339%	2035	41.3	46.57°C	0.993
	12.140V	5.022V	3.307V	4.980V	809.032				60.54°C	114.64V
CL1	0.738A	12.001A	12.001A	0.000A	109.074	86.604%	445	9.6	43.65°C	0.979
	12.143V	5.026V	3.316V	5.092V	125.946				52.20°C	115.21V

CL2	54.012A	1.002A	1.000A	1.000A	668.978	89.315%	2025	41.2	45.89°C	0.992
	12.138V	5.024V	3.308V	5.039V	749.007				59.16°C	114.62V

The results above are not used in the certification process

230V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	3.565A	1.988A	1.991A	0.984A	64.877	86.983%	0	<6.0	47.54°C	0.815
	12.139V	5.029V	3.316V	5.083V	74.586				38.12°C	230.90V
2	8.113A	2.984A	2.989A	1.183A	129.398	91.271%	0	<6.0	48.29°C	0.914
	12.139V	5.028V	3.315V	5.073V	141.774				38.44°C	230.86V
3	13.055A	3.483A	3.469A	1.383A	194.487	92.439%	450	9.9	38.54°C	0.948
	12.139V	5.028V	3.314V	5.064V	210.394				48.90°C	230.81V
4	17.999A	3.979A	3.987A	1.583A	259.699	92.903%	445	9.6	39.23°C	0.962
	12.139V	5.027V	3.313V	5.053V	279.539				50.09°C	230.77V
5	22.612A	4.974A	4.984A	1.785A	325.017	92.978%	465	9.8	39.66°C	0.971
	12.140V	5.026V	3.312V	5.043V	349.565				50.64°C	230.72V
6	27.160A	5.971A	5.979A	1.987A	389.523	92.814%	795	18.9	40.65°C	0.976
	12.140V	5.025V	3.311V	5.033V	419.683				52.02°C	230.67V
7	31.773A	6.969A	6.980A	2.191A	454.836	92.528%	1130	29.9	41.56°C	0.979
	12.140V	5.024V	3.309V	5.022V	491.564				53.19°C	230.71V
8	36.393A	7.964A	7.980A	2.395A	520.158	92.254%	1655	37.0	42.54°C	0.982
	12.138V	5.024V	3.309V	5.012V	563.835				54.42°C	230.67V
9	41.402A	8.464A	8.466A	2.398A	585.061	92.005%	2005	41.1	43.97°C	0.984
	12.138V	5.023V	3.308V	5.006V	635.904				56.20°C	230.62V
10	46.151A	8.962A	8.983A	3.009A	649.900	91.654%	2025	41.2	45.48°C	0.985
	12.138V	5.022V	3.307V	4.987V	709.083				58.16°C	230.57V
11	51.487A	8.963A	8.984A	3.012A	714.717	91.382%	2035	41.3	46.41°C	0.987
	12.139V	5.022V	3.306V	4.981V	782.120				59.81°C	230.51V
CL1	0.740A	12.002A	12.000A	0.000A	109.101	87.748%	445	9.6	44.07°C	0.900
	12.143V	5.026V	3.316V	5.091V	124.335				50.37°C	230.95V

CL2	54.016A	1.002A	0.999A	1.000A	669.025	92.214%	2025	41.2	45.69°C	0.986
	12.138V	5.025V	3.307V	5.040V	725.512				55.59°C	230.56V

The results above are not used in the certification process

Light Load Tests

115V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.172A	0.494A	0.480A	0.196A	19.296	70.980%	0	<6.0	0.860
	12.128V	5.035V	3.319V	5.107V	27.185				115.34V
2	2.427A	0.993A	0.995A	0.392A	39.729	81.845%	0	<6.0	0.930
	12.129V	5.029V	3.316V	5.100V	48.542				115.32V
3	3.619A	1.490A	1.476A	0.589A	59.286	85.605%	0	<6.0	0.957
	12.130V	5.029V	3.316V	5.094V	69.255				115.29V
4	4.873A	1.987A	1.989A	0.786A	79.711	87.547%	0	<6.0	0.970
	12.133V	5.029V	3.316V	5.088V	91.049				115.26V

The results above are not used in the certification process

230V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.193A	0.497A	0.484A	0.196A	19.591	73.068%	0	<6.0	0.538
	12.138V	5.034V	3.320V	5.106V	26.812				230.93V
2	2.446A	0.995A	0.996A	0.392A	39.994	83.058%	0	<6.0	0.713
	12.138V	5.029V	3.316V	5.100V	48.152				230.91V
3	3.631A	1.491A	1.477A	0.589A	59.470	86.919%	0	<6.0	0.796
	12.138V	5.029V	3.316V	5.094V	68.420				230.90V
4	4.886A	1.989A	1.992A	0.786A	79.913	88.916%	0	<6.0	0.849
	12.138V	5.029V	3.316V	5.087V	89.875				230.89V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	8.1 mV	4.8 mV	3.7 mV	3.9 mV	Pass
20% Load	11.7 mV	5.6 mV	4.3 mV	4.3 mV	Pass
30% Load	14.3 mV	6.0 mV	4.9 mV	4.4 mV	Pass
40% Load	17.0 mV	6.5 mV	5.6 mV	4.7 mV	Pass
50% Load	19.0 mV	7.9 mV	6.5 mV	4.9 mV	Pass
60% Load	20.4 mV	9.3 mV	7.1 mV	5.4 mV	Pass
70% Load	22.1 mV	10.4 mV	8.2 mV	7.2 mV	Pass
80% Load	22.4 mV	10.9 mV	9.0 mV	9.5 mV	Pass
90% Load	23.4 mV	9.9 mV	9.0 mV	9.8 mV	Pass
100% Load	24.5 mV	11.0 mV	9.4 mV	8.1 mV	Pass
110% Load	26.7 mV	11.5 mV	9.7 mV	8.9 mV	Pass
Crossload 1	10.6 mV	9.5 mV	8.4 mV	5.2 mV	Pass
Crossload 2	24.9 mV	8.2 mV	5.6 mV	7.8 mV	Pass

The results above are not used in the certification process

230V

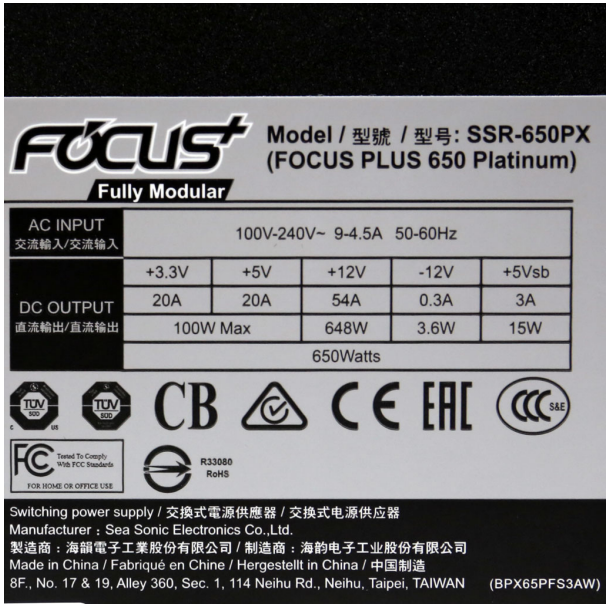
Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	8.2 mV	4.7 mV	3.6 mV	3.6 mV	Pass
20% Load	11.4 mV	5.2 mV	4.5 mV	4.0 mV	Pass
30% Load	14.3 mV	6.1 mV	4.8 mV	4.2 mV	Pass
40% Load	16.9 mV	6.5 mV	5.4 mV	4.3 mV	Pass
50% Load	19.2 mV	8.0 mV	6.3 mV	4.4 mV	Pass
60% Load	20.5 mV	8.8 mV	7.5 mV	4.9 mV	Pass
70% Load	22.2 mV	10.5 mV	8.5 mV	4.9 mV	Pass
80% Load	22.8 mV	11.0 mV	9.3 mV	5.9 mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	23.6 mV	11.0 mV	9.3 mV	6.3 mV	Pass
100% Load	25.1 mV	11.5 mV	9.8 mV	6.0 mV	Pass
110% Load	26.8 mV	11.2 mV	9.7 mV	6.7 mV	Pass
Crossload 1	10.6 mV	9.3 mV	8.3 mV	5.3 mV	Pass
Crossload 2	25.4 mV	8.0 mV	5.9 mV	5.2 mV	Pass

The results above are not used in the certification process

Seasonic Focus Plus Platinum 650W

Top side



Power specifications label

All data and graphs included in this test report can be used by any individual on the following conditions:
› It should be mentioned that the test results are provided by Cybenetics
› The link to the original test results document should be provided in any case

Cybenetics runs voluntary certification programs for power supplies - ETA for efficiency, LAMBDA for noise and SAFE for safety and correct operation - and for cooling products, with DELTA for chassis soundproofing and PHI for fan airflow and static pressure. THETA rates cooler performance on AMD AM5 and Intel LGA1851 outside ISO 17065 and accreditation scope

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